FINAL PROJECT

ANALYSIS OF HYDROCARBON TREATING SYSTEM TO THE EMISSION OF SPARK-IGNITION FOUR-STROKE ENGINE

RESEARCH PAPER

Submitted as a Partial Fulfillment of the Requirements for Getting the Bachelor Degree of Engineering in Automotive Department

Arranged by:
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MUHAMMADIYAH UNIVERSITY OF SURAKARTA
July 2011

DECLARATION OF RESEARCH AUTHENTICITY

I assert verily that the research entitles:

ANALYSIS OF HYDROCARBON TREATING SYSTEM TO THE EMISSION OF SPARK-IGNITION FOUR-STROKE ENGINE

That made to fulfill some of requirements to get Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta, as far as I know is not a plagiarism of a research that has been published, except the information source that to solve the problems.

Surakarta, July 2011
Researcher,

Binyamin

APPROVAL

The Final Project entitles "**Analysis of Hydrocarbon Treating System to The Emission of Spark-Ignition Four-Stroke Engine**" has been approved by supervisors for getting the Bachelor Degree of Engineering in Automotive Department of Muhammadiyah University of Surakarta.

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DEDICATION

This Research paper is dedicated to:

Allah SWT,

Thanks for the best everything that You have given for me and thanks for Your love that always make me to never give up to do the best. I believe that You will always give me the best for everything.

My beloved Mom and Dad,

Thanks for your prayer, love, support and affection.

You always give me happiness but often I made you disappointed.

I am sorry and I promise to give you the best in the future.

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Thanks for your supports.

It is make me strong to get something more and more.

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As long as I know you, you make me to be better and adult.

My all family,

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All my friends,

Thanks for your supports and love me.

MOTTO

فَإِنَّ مَعَ ٱلۡعُسۡرِ يُسۡرًا ۝٥ إِنَّ مَعَ ٱلۡعُسۡرِ يُسۡرًا ۝٦

[5] For indeed, with hardship [will] be ease, [6] Indeed, with hardship [will be] ease (Al-Insyirah: 5-6)

فَمَن يَعۡمَلۡ مِثۡقَالَ ذَرَّةٍ خَيۡرٗا يَرَهُۥ ۝٧ وَمَن يَعۡمَلۡ مِثۡقَالَ ذَرَّةٖ شَرّٗا يَرَهُۥ ۝٨

[7] Then shall anyone who has done an atom's weight of good, see it! [8] And anyone who has done an atom's weight of evil, shall see it.
(Al-Zalzalah: 7-8)

وَإِذۡ تَأَذَّنَ رَبُّكُمۡ لَئِن شَكَرۡتُمۡ لَأَزِيدَنَّكُمۡ وَلَئِن كَفَرۡتُمۡ إِنَّ عَذَابِي لَشَدِيدٞ ۝٧

[7]“And remember! Your Lord caused to be declared (publicly): “if ye are grateful, I will add more (favors) unto you; but if ye show ingratitude, truly My punishment is terrible indeed.” (Q.S. Ibrahim: 7)

لَهُۥ مُعَقِّبَٰتٞ مِّنۢ بَيۡنِ يَدَيۡهِ وَمِنۡ خَلۡفِهِۦ يَحۡفَظُونَهُۥ مِنۡ أَمۡرِ ٱللَّهِۗ إِنَّ ٱللَّهَ لَا يُغَيِّرُ مَا بِقَوۡمٍ حَتَّىٰ يُغَيِّرُواْ مَا بِأَنفُسِهِمۡۗ وَإِذَآ أَرَادَ ٱللَّهُ بِقَوۡمٖ سُوٓءٗا فَلَا مَرَدَّ لَهُۥۚ وَمَا لَهُم مِّن دُونِهِۦ مِن وَالٖ ۝١١

Allah will not change the condition of a people until they change what is in themselves. (Q.S. Ar-Ra’d : 11)

The Prophet (sallallahu alaihi wasallam) said "A single day under a just ruler (Khaleefah) is better than 60 years of ibadah"
(HR. Bayhaqi/Tabarani)

People are always learning will be very respected and strength not based on knowledge wills collapse.
(AL-Ghozali)

Anyone who pursue the path to knowledge therein, Allah paves the way for him to heaven (Narrated by Muslim)

Confidence is the only known antidote to failure!
(Napoleon Hill, Think & Grow Rich)

Do not always say what you know, but always know what you're saying
(Claudius)

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The writer realizes that this research paper is far from being perfect, so the writer sincerely welcomes any constructive comment, criticism, and suggestion from anyone.

Wassalamu'alaikum Warohmatullahi Wabarokatuh

Surakarta, July 2011
The Writer

Binyamin

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ABSTRACT

Binyamin. D700 070 006. Analysis of Hydrocarbon Treating System to The Emission of Spark-Ignition Four-Stroke Engine. Research Paper. Muhammadiyah University of Surakarta. 2011.

The reduction of carbon monoxide (CO), unburnt hydrocarbon (UHC) emission and fuel consumption on spark-ignition four-stroke engine is continuously attempted. The purposes from this research were to determine the effect of Hydrocarbon Treating System (HTS) on levels of CO, UHC and fuel consumption.

This is an experimental research. It is conducted by comparing the exhaust pollutant concentration such as carbon monoxide, unburnt hydrocarbon and also fuel consumption between standard engine setting and Hydrocarbon Treating System applied. The research variable are HTS flow rate from Q_1 = 0 cc/s (without HTS), Q_2 = 1.5 cc/s, Q_3 = 2 cc/s, Q_4 = 2.5 cc/s, and Q_5 = 3 cc/s. The research will be done in three conditions which are low, medium and high rotation.

The result showed that Hydrocarbon Treating System decrease fuel consumption up to 19.43% with flow rate Q_5 = 3 cc/s, but on the other hand it increase CO emission up to 80.84% with flow rate Q_5 = 3 cc/s and UHC emission level up to 124.75% with flow rate Q_5 = 3 cc/s from engine standard condition.

Keywords: *HTS, Carbon monoxide (CO), Unburnt Hydrocarbon (UHC) and fuel consumption*